(gas, indol, agglutination). The results afforded by Experiment II, previously detailed, enabled us to throw light upon this important question. They practically taught us that the Liége typhoid and Ghent colon bacilli preserved their properties when they underwent symbiosis in neutral peptone solution; it was easy to distinguish them with certainty. We made use of this useful proof to perfect new experiments.

Experiment VII.—Symbiosis of bacillus t. s. 20, and bacillus coli, Ghent (in neutral peptone solution).

Result: After six days the bacillus t. s. 20 had lost its sensibility to agglutinins; the clon bacillus Ghent preserved its indol and gas-producing properties even up to four months.

Experiment VIII.—Symbiosis of bacillus c. s. 20 and bacillus typhoid, Liége (neutral peptone solution).

Result: We proceeded as in Experiment II, and demonstrated that—

First. The bacillus typhoid Liége preserved its property of being agglutinated even up to three months;

Second. That at this time the colon bacillus c. s. 20 no longer gave indol, or could no longer ferment lactose.

These two experiments confirmed the results of the observations in Experiment I. They enabled us to affirm that when we produced symbiosis of typhoid and colon bacilli in neutral peptone solution, of the organisms from stool 20, that the typhoid lost its sensibility to agglutinins on the sixth day, while the colon bacillus is not deprived of its properties of indol and gas production until the third month of symbiosis.

They also afforded proof of the typhoid nature of the bacilli tE1, tE2, tE3, tE4, which were no longer agglutinated, but which were drawn from the mixture before the third month—that is to say, before the colon bacillus had been deprived of its indol and gas characteristics. Finally, they permit us to conclude that the typhoid bacillus lived three months in association with the colon bacillus in a solution containing both organisms.

We have just seen that symbiosis may deprive the typhoid and colon organisms of their distinctive properties. How then can we recognize the typhoid and colon bacillus thus deprived of their differential characteristics?

Characteristics of colon and typhoid bacilli which have lost their distinctive properties.

(*a*) Bacillus coli is larger, shorter, and less motile than the organism from which it is originally derived. After several successive passages through agar, the bacillus planted in bouillon always regains its original form and motility.

(*b*) Bacillus typhoid always notably preserves its form and motility. Old cultures, and even young ones, maintained at a temperature of 37° C., always present a great tendency to the formation of long threads. The cilia are particularly difficult to stain.

Cultural characteristics.

Ordinary bouillon.—The colon bacillus renders the medium uniformly turbid, thickens it considerably, and gives it a gluish, gelatinous appearance. Sometimes, also, there is a superficial pellicle.

The typhoid bacillus produces a uniform turbidity. On shaking there is seen the play of colors characteristic of motile organisms. Upon the surface of the bouillon there is a pellicle, ordinarily thin, sometimes, however, quite thick.

Agar-agar slants.—The growth is rather sparse for both organisms; more abundant however for the typhoid than for the colon. It must be stated that the colon bacilli which give a pellicle in bouillon grow only upon the needle streak, while the bacilli which do not produce the pellicle in bouillon, give little or no growth along the streak of the needle. If we bear in mind that we almost always actively shake the flask before planting the plates, we arrive at a possible explanation of this singular peculiarity. The colon bacilli coming from the bottom of the flask render the bouillon turbid, but do not grow when planted along a streak on agar. The colon bacilli coming from the surface, give a pellicle in bouillon and grow well in streak on inclined agar-agar.

Gelatin.—Planted in tubes both organisms present a like appearance.

Characteristics of colonies on plates.

A. *Typhoid bacillus.*—Superficial colonies, as we have shown in the first part of our work, are excessively rare. We only, therefore, examine the deep colonies. These are small and bluish white.

B. *Colon bacillus.*—The colonies are either superficial or deep. The superficial are diffuse or globular; the deep are quite large, of a yellow brown color, or else are punctiform and bluish. Further details would be useless, as the most perfect description is not equal in value to the observation which anyone may make for himself.

Before leaving this subject of cultural characteristics we wish to draw particular attention to the two following points:

First. Colon and typhoid bacilli thus deprived of their characteristics by symbiosis at room temperature (from July 7 to October 29), no longer grow at a temperature of 37° C., and do not render bouillon turbid. On the contrary they grow energetically between 25° and 30° C.

Second. After a certain number of replantings on agar slants or in bouillon, even very much attenuated colon and typhoid bacilli regain their vitality, but never recover their distinctive properties (gas, indol, agglutination).

Bacteriologists are unanimous in agreeing that morphological and cultural characteristics are too indefinite to serve as a basis of differentiation between the typhoid and colon organism; is it therefore reasonable to ask it when it is a question of determining differences between organisms deprived of their specific characteristics?

If we judge, on the one hand, that Experiments VII and VIII have